Keywords: Isokinetic; Knee; Rugby; Evaluation

Introduction.– Isokinetic testing of the knee is very helpful to prevent leg muscular injuries and knee injuries. To analyse the results of the tests we need references values specific to the rugby players. Since these datas were not available in the litterature, the Fédération Française de Rugby and the Ligue Nationale du Rugby decided to assess these isokinetics parameters in french Professional rugby players.

Materials and methods.– Multicentric observational study including eight professionnals clubs with measure of isokinetic knee strength for 250 players. Protocol testing was two concentric sets for quadriceps and hamstrings at the speed of 60°/s and 240°/s and one eccentric test at 30°/s, only for the hamstrings.

Results.– Concentric strength at 60°/s: quadriceps strength is 2.4 N.m/kg for the first row, 2.5 N.m/kg for the second and third row and 2.7 N.m/kg for the halfs and backs. For the hamstring the strength is 1.4 N.m/kg for the first row, 1.6 N.m/kg for the second and third row and 1.7 N.m/kg for the halfs and backs. Concentric strength at 240°/s: quadriceps strength is 1.6 N.m/kg for the first row, 1.8 N.m/kg for second and third row and 1.9 N.m/kg for the halfs and backs. For the hamstring the strength is 1.2 N.m/kg for the first row, 1.,3 N.m/kg for the second, the third row and the halfs and 1.4 N.m/kg for the backs.
Eccentric strength at 30°/s: for the hamstring the strength is 1.9 N.m/kg for the first row, 2.0 N.m/kg for the second and third row and 2.1 N.m/kg for the halfs and backs.

Discussion.– We found some differences between players, according to their playing position, mainly due anthropometric differences (weight). These results will be very useful to interpret properly the isokinetics test of the knee for the rugby players, according to their playing position.

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Aerobic performance and isokinetic assessement of submariners before and after patrol

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Keywords: Cardiovascular deconditioning; Muscle Strength, Isokinetic evaluation; Muscular fatigue; Submariners

Introduction.– The operational capacity of a nuclear submarine is closely linked to the performance of his crew, especially physical capacities. The constraint environment in submarine (reduced living space and sports equipments, special rhythm of work, lack of natural light, stressful environment) and limited participation could lead to a state of deconditioning in effort after deployment by a reduction of physical activity.

Purpose.– The main aim of this study was to evaluate whether a submarine deployment could lead to central and/or peripheral deconditioning.

Methods.– Thirty-four submariners (aged 26.6 ± 4.3 years, watch schedule, practising aerobic sports 80%) underwent a triangular type cardio respiratory test with an electromagnetic cycle ergometer, an assessment of muscles strength (quadriceps and hamstring) with an isokinetic dynamometer at 60°/s and 180°/s and anthropometric measurements, before and after a patrol period of two months (65 ± 2.68 days).

Results.– The aerobic capacity at maximal exercise, after deployment, significantly decreased of 3% ($P = 0.03$), with VO_2max before patrol at 46.4 ± 6.5 mL/kg/min and after at 44.9 ± 5.7 mL/kg/min. There was no significant difference in heart rate at maximal effort, maximal aerobic power or sub-maximal VO_2 at 200 W. Regarding muscular parameters, isokinetic fatigue index at 180°/s was significantly increased of 11% (1.8 ± 0.6 vs 2 ± 0.6 J/s, $P = 0.05$) for quadriceps as well as for hamstrings of 8% (1.2 ± 0.8 vs 1.3 ± 0.3 J/s, $P = 0.05$). No significant difference for explosive strength was found for quadriceps/hamstrings peaks torques at 60°/s. Anthropometric values (weight, fat mass and waist measurement) increased significantly ($P < 0.05$).

Conclusion.– This study shows that submariners have impaired cardio-respiratory performances, accompanied by increased peripheral muscular fatigability after two-months submarine deployment.

Further reading

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Influence of fatigue on running biomechanics in adolescent athletes

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Keywords: Injury; Prevention; Medial arch; Foot; Ankle

Introduction.– Foot/ankle muscles fatigue which results in alterations of running biomechanics and plantar pressure distribution may lead to an increased injury risk [1].

Methods.– Effects of fatigue were measured in 11 young athletes during a time to exhaustion running bout on treadmill at 95% of the maximal aerobic speed [1]. Tested parameters were resistance to fatigue (isokinetic) in ankle plantar and dorsi-flexors, stride frequency and length, vertical stiffness, leg stiffness and vertical ground reaction force, as well as foot plantar pressure distribution (embedded insoles with sensors).

Results.– Resistance to fatigue was significantly reduced in ankle plantar flexors in fatigued state (fatigue index dropping from –23.8% in pre to –30.5% in post, $P < 0.05$), but not in dorsi-flexors (from –27.6% to –32.0%, $P > 0.05$).
Leg stiffness decreased (–7.4%, $p < 0.01$) and vertical ground reaction force increased (+22.5%, $P < 0.05$) in fatigued state, whereas other parameters remained unchanged.
Contact area and relative load under the foot medial arch increased significantly in fatigued state (+9.6% and +6.4%, $P < 0.01$).

Discussion.– The decrease of the triceps resistance to fatigue may induce an imbalance between ankle plantar and dorsi-flexors, affecting the protective action of these muscles and increasing potentially the risk of overuse injuries.
Fatigue-related biomechanical adaptations of young athletes appeared very specific and favoured vertical force production during the stance phase, in opposition to adults who tended to decrease stride frequency and vertical force in order to protect their lower limbs' musculoskeletal structures [1].
Foot medial arch seems to be a key structure during the load absorption process in fatigued state. This may justify the preventive strengthening of the intrinsic and extrinsic muscles supporting the medial arch, using for instance barefoot running or electrostimulation [1].

Reference

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Seasonal variation in vitamin D status in professional soccer players of French second League

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Introduction.– Although vitamin deficiency has a high prevalence in the world, no study focuses on the vitamin status of athletes.
Purpose.– Monitoring of seasonal variation in serum 25 (OH) D3 in a population of a professional football player.
Materials and methods.– A prospective study from February 2011 to February 2013 of 54 professional footballers League 2 (Berry club Châteauroux) seasonal variation of 25 (OH) D3 plasma. Blood samples were taken in July and February each year. Data were collected on three seasons. In the third season, all patients were supplemented with vitamin D in November 2012 by cholecalciferol 100,000 IU every 15 days during 2 months. It has not been made collection on daily intake and supplementation with vitamin D and calcium.
Results.– In February 2011, only 13% of players had normal levels of vitamin D hypovitaminosis 43% and 44% a severe disability. One hundred percent of patients were black races deficit in February 2011. In July 2011, 86% of patients had a higher optimum vitamin and only 14% hypovitaminosis. The following year, in February 2012, we found similar results. After supplementation in November 2012, 94% of patients had a higher rate than 30 ng/mL in February 2013.
Discussion.– As already demonstrated the Galan [1] in 2012, a serum 25 (OH) D of approximately 48.5 ng/mL is needed in mid-October to ensure sufficient vitamin D $\geq$30 ng/mL at the beginning of February. The intensive practice of an outdoor sport does not exclude the risk of hypovitaminosis D, particularly as patients are of African origin. It would also be interesting to correlate these results with the daily intake of vitamin D and calcium play.
Conclusion.– Professional footballers have a high risk of hypovatimanose D although they practiced an intensive sport outdoors. This risk is increased among footballers of African origin. This reflection draws questions on vitamin status of the athlete. It deserves to continue our study on a possible association with injuries and bad performance.

Reference

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Vitamin D and sport: Which impacts and incidences of health on sport, especially in athletics

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Keywords: Vitamin D; Injuries; Questionnaire; Insufficiency; Deficiency; Athletes

Introduction.– The vitamin D plays a role in the life of an athlete at least because of its impact on the immunizing functions and on the bones and muscular metabolisms. No value of the status in vitamin D at the top-level athletes of French Athletics Federation (FFA) was recently published. Having located during the biological follow-up of the athletes of the FFA in 2012 numerous deficits even deficiencies, the medical committee of the FFA wondered about the impacts on the health of this situation and on the medical measure to be taken and decided to launch two studies in 2013/2014.
Purpose.– In this pre-study, we make the bibliography before launching a study to validate a screening questionnaire of the risk of deficit in vitamin D in top-level athletes and to make the link enters low prevalence of the French athletes reaching in the winter period and the optimal values recognized by 25 vitamin D 3 and the incidence of their injuries.
Methods.– We questioned in April, 2013 databases: Scopus, Sciences Direct, Pubmed with different combinations using keywords in English: vitamin D 3 or vitamin D+ ''athletes, sport, physical activity, athletics, muscle, injury, stress fractures, bone, physical performance, supplementation''.
Results.– We located 80 articles affecting several different sports and after analysis we kept about 40 more specific articles for our two themes. We shall present the recent data of the literature and the values of the dosages of vitamin D in serum realized during the biological follow-up FFA on 2012.
Discussion.– We shall suggest a questionnaire of screening of the risk of deficit in vitamin D validating and a project of forward-looking study on the links enters deficit vitamin D and injuries.
Conclusion.– The links between blood status of vitamin D and injuries at the French athletes questioned us, the possibility of detecting the vitamin D deficits by a questionnaire questioned us and we launch studies which aims to be multicenter even with others sports federation on these two questions.

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